Serial No.: 10/664,329
Art Unit: 1745

Amendment to the Specification

Please amend the second paragraph of page 1 as follows, where additions relative to the original are indicated by underlines, while deletions relative to the original are indicated by strike-throughs:

The use of catalysts to facilitate the electrochemical reaction between hydrogen and oxygen in fuel cells ~~are~~ is well-known. Typically, the catalyst is in the form of a noble metal powder that is distributed on a support that is itself a powder of larger carbon or carbon-based particles. This powder-based approach allows for a significant increase in surface area upon which the aforementioned reaction can take place. While such a configuration provides for an efficient, compact reactor that by spreading the relatively expensive catalyst (such as platinum) over a large area results in significant improvements in power output with simultaneous reduction in raw material cost, its effectiveness can be limited by certain modes of operation. For example, even when the need for electric current produced in a fuel cell is reduced or ceases, the residual oxygen and hydrogen reactants continue to generate an open circuit voltage (typically around 0.9V or higher) that can lead to catalyst and catalyst support oxidation, thereby reducing fuel cell life. Of even greater concern is the presence of a hydrogen-air interface on one of the fuel cell electrodes (such as the anode) while air is present on the other electrode (such as the cathode), which can lead to potentials of between 1.4V and 1.8V being generated. These elevated potentials exacerbate the aforementioned corrosion of the catalyst and catalyst support material. This situation can occur during startup (when air is being purged by hydrogen) and during shutdown (when air is entrained into the anode as hydrogen is consumed by cross-over). The present inventors have observed that operational transients, particularly repeated system startup and shutdown, appear to shorten fuel cell life much faster than the comparable steady-state operation that takes place between such transients.